SIEMENS

SIMATIC NET

Industrial Ethernet switches
SCALANCE X-100

Operating Instructions

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Table of contents

Introduction

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1.1 On the Operating Instructions

Purpose of the Operating Instructions

These Operating Instructions support you when commissioning networks with the Industrial Ethernet switches of the SCALANCE X-100 product line.

Validity of the Operating Instructions

These operating instructions are valid for the following devices:

Device	Order number
SCALANCE X104-2	6GK5 104-2BB00-2AA3
SCALANCE X106-1	6GK5 106-1BB00-2AA3
SCALANCE X108	6GK5 108-0BA00-2AA3
SCALANCE X108PoE	6GK5 108-0PA00-2AA3
SCALANCE X112-2	6GK5 112-2BB00-2AA3
SCALANCE X116	6GK5 116-0BA00-2AA3
SCALANCE X124	6GK5 124-0BA00-2AA3

Further documentation

The "SIMATIC NET Industrial Ethernet Twisted Pair and Fiber Optic Networks" manual contains additional information on other SIMATIC NET products that you can operate along with the IE switches of the SCALANCE XB-000 product line in an Industrial Ethernet network.

You can order the manual "SIMATIC NET Industrial Twisted Pair and Fiber Optic Networks", release 05/2001, using the following order numbers:
6GK1970-1BA10-0AA0 German
6GK1970-1BA10-0AA1 English
6GK1970-1BA10-0AA2 French
6GK1970-1BA10-0AA4 Italian

You will also find this network manual on the Internet pages of Service & Support under the following entry ID: 1172207 (http://support.automation.siemens.com/WW/view/en/1172207).

You will find further information in the "System Manual Industrial Ethernet" in the Manual Collection.

You will find further information on the SCALANCE system on the Internet at www.siemens.com/scalance (www.siemens.com/scalance).

You can obtain the "PROFINET Installation Guide" from the PROFIBUS User Organization (PNO).

Audience

These Operating Instructions are intended for persons who commission networks with the IE switches of the SCALANCE X-100 product line.

SIMATIC NET glossary

Explanations of many of the specialist terms used in this documentation can be found in the SIMATIC NET glossary.

You will find the SIMATIC NET glossary here:

- SIMATIC NET Manual Collection or product DVD

  The DVD ships with certain SIMATIC NET products.

- On the Internet under the following entry ID:

  50305045 (http://support.automation.siemens.com/WW/view/en/50305045)

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. For more information about industrial security, visit http://www.siemens.com/industrialsecurity.

To stay informed about product updates as they occur, sign up for a product-specific newsletter. For more information, visit http://support.automation.siemens.com.

1.2   On the product

What is possible?

The devices of the SCALANCE X100 product line allow the cost-effective installation of Industrial Ethernet bus and star structures with switching functionality.

With the following IE switches, there are also electrical/optical media transitions:

- SCALANCE X104-2
- SCALANCE X106-1
- SCALANCE X112-2

IE switches with the suffix PoE also allow the supply of power to end devices over Ethernet cables with Power-over-Ethernet complying with 802.3af.

Note

If devices are supplied over long 24 V power supply lines or networks, measures are necessary to prevent interference by strong electromagnetic pulses on the supply lines. These can result, for example, due to lightning or switching of large inductive loads.

One of the tests used to attest the immunity of these devices to electromagnetic interference is the "surge immunity test" according to EN 61000-4-5. This test requires overvoltage protection for the power supply lines. A suitable device is, for example, the Dehn Blitzductor BVT AVD 24 V type no. 918 422 or a comparable protective element.

Manufacturer:
DEHN+SÖHNE GmbH+Co.KG Hans Dehn Str.1 Postfach 1640 D-92306 Neumarkt, Germany

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⚠ **WARNING**

When used in hazardous environments corresponding to Class I, Division 2 or Class I, Zone 2, the device must be installed in a cabinet or a suitable enclosure.

⚠ **WARNING**

To comply with EU Directive 94/9 (ATEX95), this enclosure must meet the requirements of at least IP54 in compliance with EN 60529.

⚠ **WARNING**

EXPLOSION HAZARD

DO NOT CONNECT OR DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.

Components of the product

The following components are supplied with a SCALANCE X-100:

- IE Switch SCALANCE X-100
- 2-pin plug-in terminal block (signaling contact)
- 4-pin plug-in terminal block (power supply)
- Product information

Accessories

Component	Packaging unit	Order number
IE FC Stripping Tool	1	6GK1901-1GA00
IE FC blade cassettes (5 mm)	1	6GK1901-1GB01
IE FC TP standard cable GP	1	6XV1840-2AH10
IE FC TP trailing cable	1	6XV1840-3AH10
IE FC TP marine cable	1	6XV1840-4AH10
IE FC TP trailing cable GP	1	6XV1870-2D
IE FC TP flexible cable GP	1	6XV1870-2B
IE FC TP FRNC cable GP	1	6XV1871-2F
IE FC TP festoon cable GP	1	6XV1871-2S
IE FC TP food cable	1	6XV1871-2L
IE TP torsion cable	1	6XV1870-2F
FO standard cable GP (50/125)	1	6XV1873-2A
FO trailing cable (50/125)	1	6XV1873-2C
FO trailing cable GP (50/125)	1	6XV1873-2D
FO ground cable (50/125)	1	6XV1873-2G
FO FRNC cable (50/125)	1	6XV1873-2B
IE FC RJ-45 Plug 180	1	6GK1901-1BB10-2AA0
IE FC RJ-45 Plug 180	10	6GK1901-1BB10-2AB0
IE FC RJ-45 Plug 180	50	6GK1901-1BB10-2AE0

Unpacking and checking

⚠ WARNING
Do not use any parts that show evidence of damage
If you use damaged parts, there is no guarantee that the device will function according to the specification.
If you use damaged parts, this can lead to the following problems: • Injury to persons • Loss of the approvals • Violation of the EMC regulations • Damage to the device and other components Use only undamaged parts.

1. Make sure that the package is complete.

2. Check all the parts for transport damage.

Network topologies

<div style="text-align: right; font-size: 3em;">2</div>

Switching technology allows extensive networks to be set up with numerous nodes and simplifies network expansion.

Which topologies can be implemented?

Using the IE switches of the SCALANCE X-100 product line, you can implement star topologies.

Note

Keep to the maximum permitted cable lengths of the devices you are using. You will find the permitted cable lengths in the section "Technical specifications (Page 41)".

Star topology
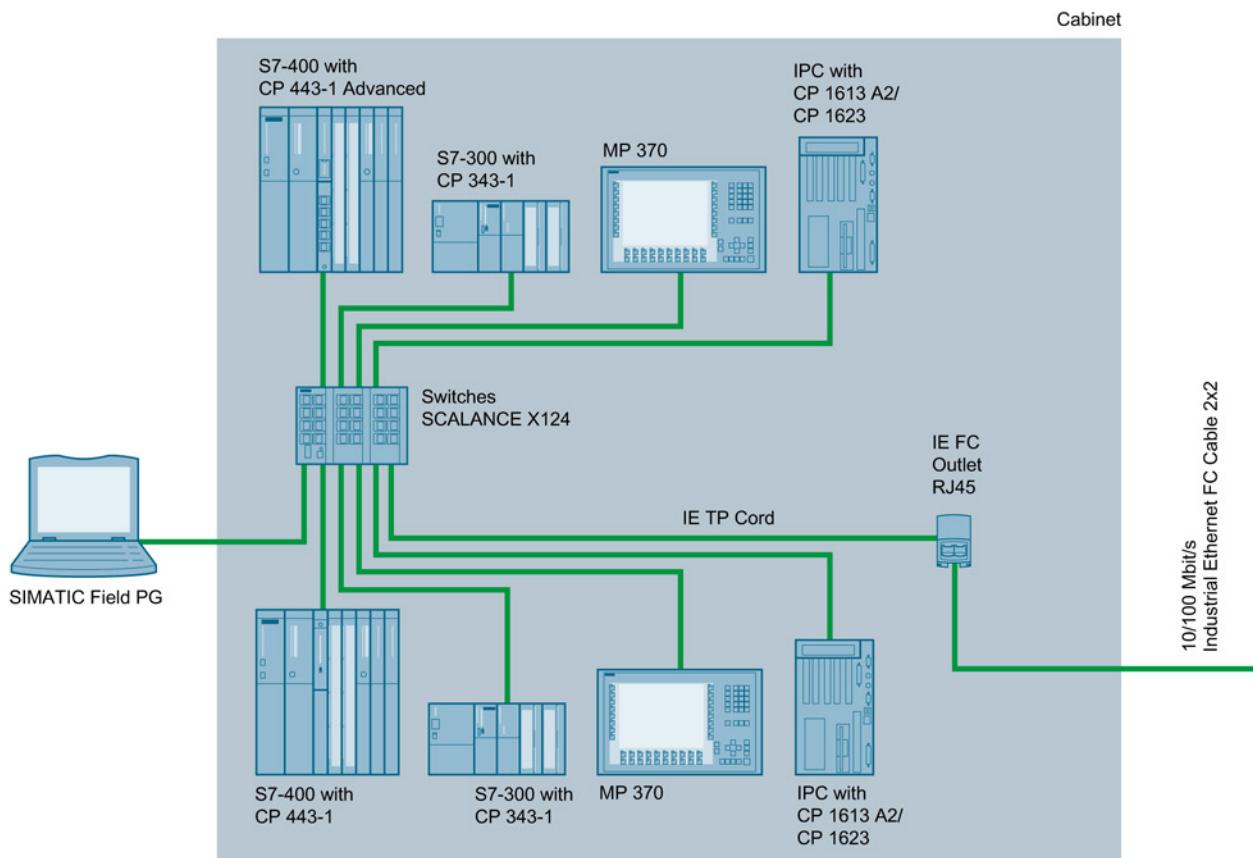
Figure 2-1   Example of an electrical star topology with SCALANCE X124
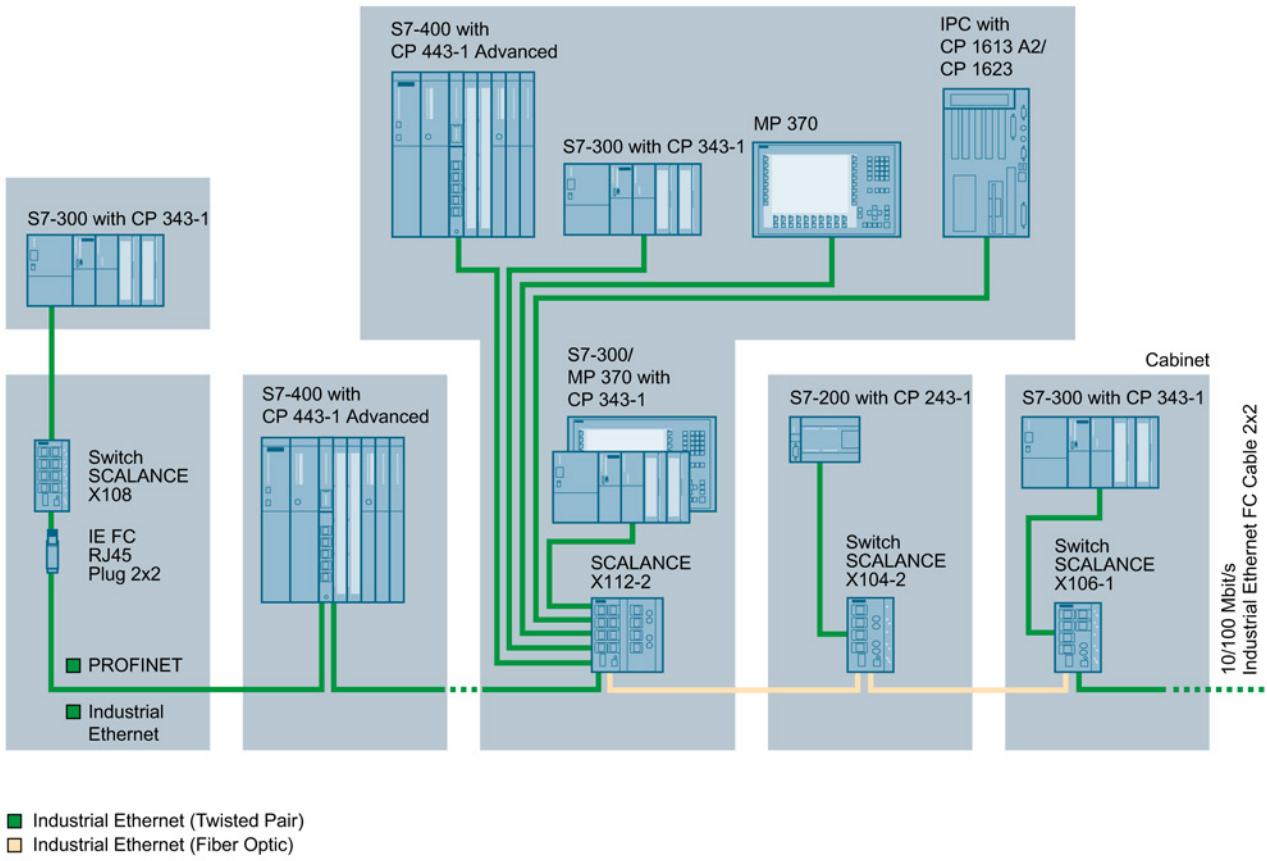
Figure 2-2   Example of an electrical/optical star topology with SCALANCE X112-2 and SCALANCE X104-2

Description of the device

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3.1 Overview of the SCALANCE X-100

Table 3- 1   Overview of the product characteristics

Device type SCALANCE							
	X104-2	X106-1	X108	X108PoE	X112-2	X116	X124
SIMATIC environment	+	+	+	+	+	+	+
Diagnostics LED	+	+	+	+	+	+	+
24 VDC	+	+	+	+	+	+	+
2 x 24 VDC	+	+	+	+	+	+	+
Compact housing (securing collar, etc.)	+	+	+	+	+	+	+
Signaling contact + on-site operation	+	+	+	+	+	+	+
Diagnostics: Web, SNMP, PROFINET	-	-	-	-	-	-	-
C-PLUG	-	-	-	-	-	-	-
Ring redundancy with RM	-	-	-	-	-	-	-
Passive ring redundancy	-	-	-	-	-	-	-
Standby redundancy	-	-	-	-	-	-	-
IRT capability	-	-	-	-	-	-	-
Fast learning	-	-	-	-	-	-	-
Passive listening	-	-	-	-	-	-	-
Log table	-	-	-	-	-	-	-
SNTP + SICLOCK	-	-	-	-	-	-	-
Cut Through	-	-	-	-	-	-	-
Number of PoE ports	-	-	-	2	-	-	-

Fast learning:
Fast recognition of MAC addresses on the device that change during operation (for example, when an end node is reconnected).

Table 3- 2   Overview of the connection options

Device type SCALANCE							
	X104-2	X106-1	X108	X108PoE	X112-2	X116	X124
TP (RJ-45) Fast Ethernet 10 / 100 Mbps	4	6	8	8	12	16	24
Fiber multimode (BFOC) Fast Ethernet 100 Mbps	2	1	-	-	2	-	-

3.2 Product properties

3.2.1 SCALANCE X104-2

Possible connections

The SCALANCE X104-2 has four RJ-45 jacks and two BFOC sockets for the connection of end devices or other network segments.

Note

The BFOC socket (Bayonet Fiber Optic Connector) corresponds to the ST socket.

Figure 3-1   SCALANCE X104-2

3.2.2 SCALANCE X106-1

Possible connections

The SCALANCE X106-1 has six RJ-45 jacks and a BFOC socket for the connection of end devices or other network segments.

Note

The BFOC socket (Bayonet Fiber Optic Connector) corresponds to the ST socket.

Figure 3-2   SCALANCE X106-1

3.2.3 SCALANCE X108

Possible connections

The SCALANCE X108 has eight RJ-45 jacks for the connection of end devices or other network segments.

Figure 3-3   SCALANCE X108

3.2.4 SCALANCE X108PoE

Possible connections

The SCALANCE X108 PoE has eight RJ-45 jacks for the connection of end devices or other network segments. Ports 1 to 2 do not have the PoE function.

Figure 3-4   SCALANCE X108PoE

Power over Ethernet (PoE) function

The PoE function allows the power supply of connected Ethernet devices via the Ethernet cable so that the end device does not need a separate power supply.

Per PoE port of the PSE (Power Sourcing Equipment), a maximum of 15.4 W power are available according to the 802.3af standard.

Note

With a 100 m long cable connected, the end device then has a maximum of 12.95 W available.

You will find more information on the PoE function in the section "TP ports (Page 21)".

3.2.5 SCALANCE X112-2

Possible connections

The SCALANCE X112-2 has twelve RJ-45 jacks and two BFOC sockets for the connection of end devices or other network segments.

Note

The BFOC socket (Bayonet Fiber Optic Connector) corresponds to the ST socket.

Figure 3-5　　SCALANCE X112-2

3.2.6 SCALANCE X116

Possible connections

The SCALANCE X116 has 16 RJ-45 jacks for the connection of end devices or other network segments.

Figure 3-6   SCALANCE X116

3.2.7 SCALANCE X124

Possible connections

The SCALANCE X124 has 24 RJ-45 jacks for the connection of end devices or other network segments.

Figure 3-7   SCALANCE X124

3.3 TP ports (twisted pair)

RJ-45 connector pinout

With SCALANCE X-100, the twisted-pair port is designed as an RJ-45 jack with MDI-X pin assignment (Medium Dependent Interface Autocrossover) of a network component.

Special features of the SCALANCE X108PoE

Over and above the pure Ethernet functionality, ports 1 and 2 of the SCALANCE X108PoE can also be used to supply power to Power-over-Ethernet end devices (for example SCALANCE-W) in compliance with 802.3af.

The two ports providing PoE are supplied from the same power source. This means that they are electrically interconnected. They are however isolated from ground, from the ports that do not provide PoE and from the power connector (24 V). Their use is therefore subject to the conditions listed in IEEE 802.3af for Environment A.

The ports that do not provide PoE are all isolated from each other.

Ports 3 to 8 do not have the PoE function.

To supply PoE end devices, 4 or 8-wire connecting cables can be used (according to IEEE 802.3).

Note

Ethernet devices without PoE functionality can also be connected to ports 1 and 2. A voltage is applied only after the SCALANCE X108 PoE has detected a PoE end device complying with the standard at the port.
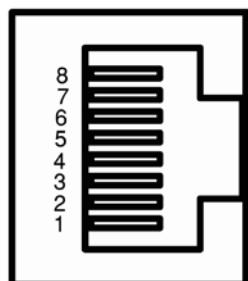
Pin number	Assignment	Additional pins P1, P2 of the SCALANCE X108PoE
Pin 8	n. c.	-
Pin 7	n. c.	-
Pin 6	TD-	positive supply voltage
Pin 5	n. c.	-
Pin 4	n. c.	-
Pin 3	TD+	positive supply voltage
Pin 2	RD-	negative supply voltage
Pin 1	RD+	negative supply voltage

Note

Permitted cable lengths

TP cords or TP-XP cords with a maximum length of 10 m can be connected to the TP port with the RJ-45 jack.

With the IE FC cables and IE FC RJ-45 plugs 180, an overall cable length of a maximum of 100 m is permitted between two devices depending on the cable type.

Autonegotiation

With the autonegotiation mechanism, repeaters and end devices can automatically determine the transmission speed and the transmission mode of the partner port. This makes it possible to configure different devices automatically.

Two components connected to a link segment can exchange information about the data transfer and can adapt their settings to each other. The mode with the highest possible speed is set.

Note

Devices not supporting autonegotiation must be set permanently to 100 Mbps half duplex or 10 Mbps half duplex.

Note

The IE switches of the SCALANCE X-100 product line are plug-and-play devices that require no settings during commissioning.

Auto polarity exchange

If the pair of receiving cables is connected incorrectly (RD+ and RD- interchanged), the polarity is adapted automatically.

MDI / MDI-X autocrossover function

With the MPI/MDI-X autocrossover function, the send and receive contacts of an Ethernet port are assigned automatically. The assignment depends on the cable with which the communications partner is connected. This means that it does not matter whether the port is connected using a patch cable or crossover cable. This prevents malfunctions resulting from mismatching send and receive wires. This makes installation much easier for the user.

The IE Switches SCALANCE X-100 all support the MDI / MDI-X autocrossover function.

NOTICE
Formation of loops
Note that the direct connection of two ports or accidental connection over several switches causes an illegal loop that can cause network overload and failure.

3.4 FO port (fiber optic)

Transmission speed

The transmission speed of the optical Fast Ethernet ports is 100 Mbps.

Transmission technique

The transmission mode for 100Base-FX is specified in the IEEE 802.3 standard.

Since the full duplex mode and the transmission rate cannot be modified for optical transmission, autonegotiation cannot be selected.

Transmission medium

Data transmission is over multimode fiber-optic cable (FO cable). The wavelength is 1310 nm.

Multimode fiber-optic cables are used with a core of 50 or 62.5 µm; the light source is an LED.

The outer diameter of the FO cable is 125 µm.

Transmission range

The maximum transmission range (segment length) is as follows:

- with 62.5/125 µm fiber multimode SIMATIC NET cable: 4 km
- with 50.0/125 µm fiber multimode SIMATIC NET cable: 5 km

Connectors

The cables are connected over BFOC sockets.

3.5 LEDs

Fault LED "F" (red LED)

The fault LED indicates the incorrect functioning of the device.

LED color	LED status	Meaning
Red	Lit	The SCALANCE switch X-100 detects a fault. At the same time, the signaling contact opens. The following faults/errors are detected: 1. Link down event on a monitored port. 2. Loss of the power supply of one of the two redundant power supplies or the power supply drops below 14 V. 3. Both power supplies are below approximately 14 V (voltage too low).
-	Off	No problem has been detected by the SCALANCE X-100.

Power LED "L" (green LED)

The power LED shows the status of the power supply.

LED color	LED status	Meaning
Green	Lit	Power supply L1 or L2 is connected.
-	Off	Power supply L1 and L2 are not connected or L1 and L2 <14 V.

Note

If the green LED is not lit, no other signal LED lights up either.

Port LEDs "P" (green/yellow LEDs)

The port LEDs indicate the status of the ports.

LED color	LED status	Meaning
Green	Lit	Link exists, no data reception at port
Yellow	Lit	Link exists, data reception at port
Yellow	Flashing	Setting or display of the fault mask

3.6 SET button

Function

With the SET button, you can display and change the set fault mask.

## Setting the fault mask

Factory setting

When supplied (factory defaults), the fault mask is set so that the power supply L1+/M1 is monitored. No ports are monitored.

If you connect a power supply to L2+/M2, adapt the fault mask accordingly: Clear the error LED and the signaling contact or set the fault mask to the power supply L2+/M2.

Changing the setting

The changed settings remain after cycling power to the device.

Different settings are made depending on how long you hold down the SET button, as described in the following table:

Time the button is pressed in seconds

Phase	Description	
1	LEDs flash at 5 Hz	The currently set fault mask is displayed. The LEDs of the monitored ports flash.
		If no fault mask is set, all port LEDs flash one after the other.
	If you release the button in phase 1, this has no effect.	
2	LEDs flash at 2.5 Hz	The current status is displayed.
		• The LEDs of the ports at which there is currently a link flash.
		• The LEDs of the connected power supply flash.
	If you release the button in phase 2, this has no effect.	
3	This new status is adopted and stored as the new fault mask in phase 3.	
	LEDs flashing	If you release the SET button while the LEDs are still flashing, storing is aborted.
	LEDs lit	If you release the SET button as soon as the LEDs light up, the current settings will be stored.
		The stored status is displayed.
		• The monitored ports are indicated by statically lit LEDs.
		• The monitored power supply is indicated by statically lit LEDs.

Note

If an empty fault mask is set or needs to be set, the 2 port LEDs flash alternately. If the fault mask is empty, no port is monitored.

Note

The PoE voltage at the PoE ports cannot be monitored using the fault mask.

Error/fault

If the link is lost at a monitored port or a monitored power supply is lost, this is signaled as follows:

- the red fault LED lights up
- the signaling contact is opened

Assembly

<div align="right">

4

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4.1   Types of installation

The devices can be installed in the following ways:

- Installation on a 35 mm DIN rail

- Installation on a SIMATIC S7-300 standard rail

- Wall mounting

⚠ WARNING

Ambient temperature between 55 °C and 60 °C

If a device is operated in an ambient temperature of more than 55 °C, the temperature of the device housing may be higher than 70 °C. The device must therefore be installed so that it is only accessible to service personnel or users that are aware of the reason for restricted access and the required safety measures at an ambient temperature higher than 55 °C.

⚠ WARNING

If a SCALANCE X108PoE is operated at ambient temperatures between 55 °C and 60 °C, there must be a minimum clearance of 40 mm to neighboring modules.

⚠ WARNING

If the cable or conduit entry point exceeds 70 °C or the branching point of conductors exceeds 80 °C, special precautions must be taken. If the equipment is operated in an air ambient in excess of 50 °C to 60 °C, only use cables with admitted maximum operating temperature of at least 80 °C.

⚠ WARNING

Protective measures need to be taken to ensure that the rated voltage of the equipment cannot be exceeded by more than 40% by transient surges. This is achieved by operating the equipment only with SELV circuits (previously also PELV). Under no circumstances must transient surges exceed 119 V.

Note

When installing and operating the device, keep to the installation instructions and safety-related notices as described here and in the manual "SIMATIC NET Industrial Ethernet Twisted Pair and Fiber Optic Networks".

Note

Provide suitable shade to protect the device against direct sunlight. This avoids unwanted warming of the device and prevents premature aging of the device and cabling.

4.2   Installation on a DIN rail

Installation

To install the device on a 35 mm DIN rail complying with DIN EN 50022, follow the steps below:

1. Place the second housing guide of the device on the top edge of the DIN rail.

2. Press the device down against the DIN rail until the spring catch locks in place.

3. Fit the connectors for the power supply. See also section "Power supply (Page 33)".

4. Fit the connectors for the signaling contacts. See also section "Signaling contacts (Page 35)".

5. Insert the terminal blocks into the sockets on the device.

> ⚠ **WARNING**
>
> **Use of the SCALANCE X108PoE in shipbuilding**
>
> When used in shipbuilding, mounting the SCALANCE X108PoE on 35 mm DIN rails is not permitted.
>
> 35 mm DIN rails do not ensure sufficient stability when used in shipbuilding.
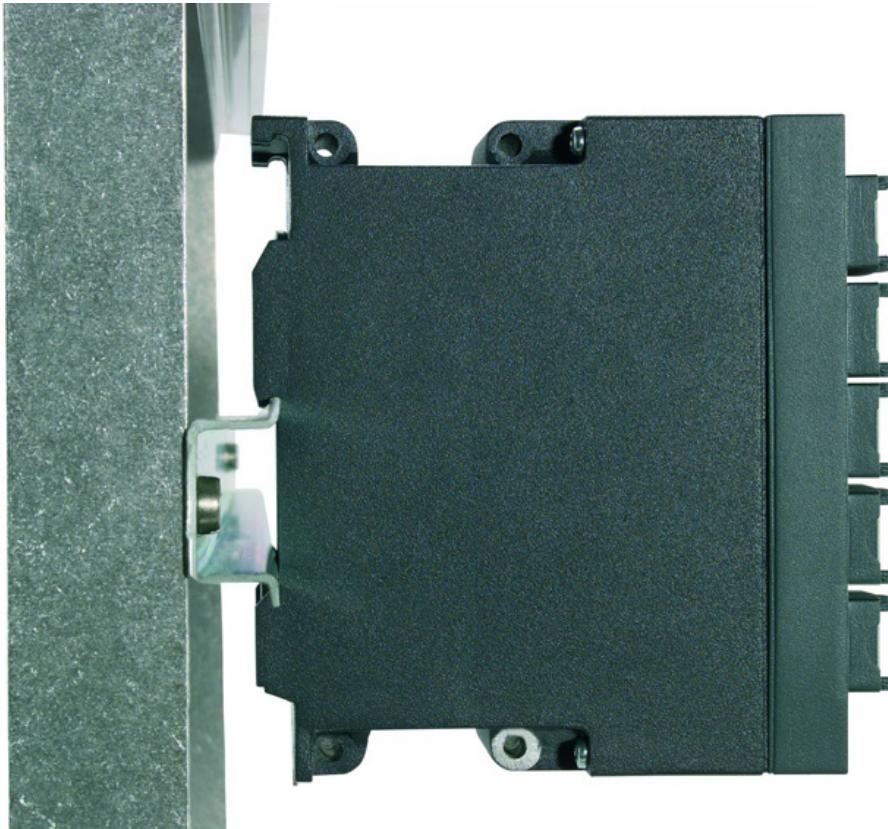

Figure 4-1   Installation on a 35 mm DIN rail

Uninstalling

To remove the device from the DIN rail, follow the steps below:

1. Disconnect all connected cables.
2. Release the DIN rail catch on the bottom of the device using a screwdriver.
3. Pull the lower part of the device away from the DIN rail.
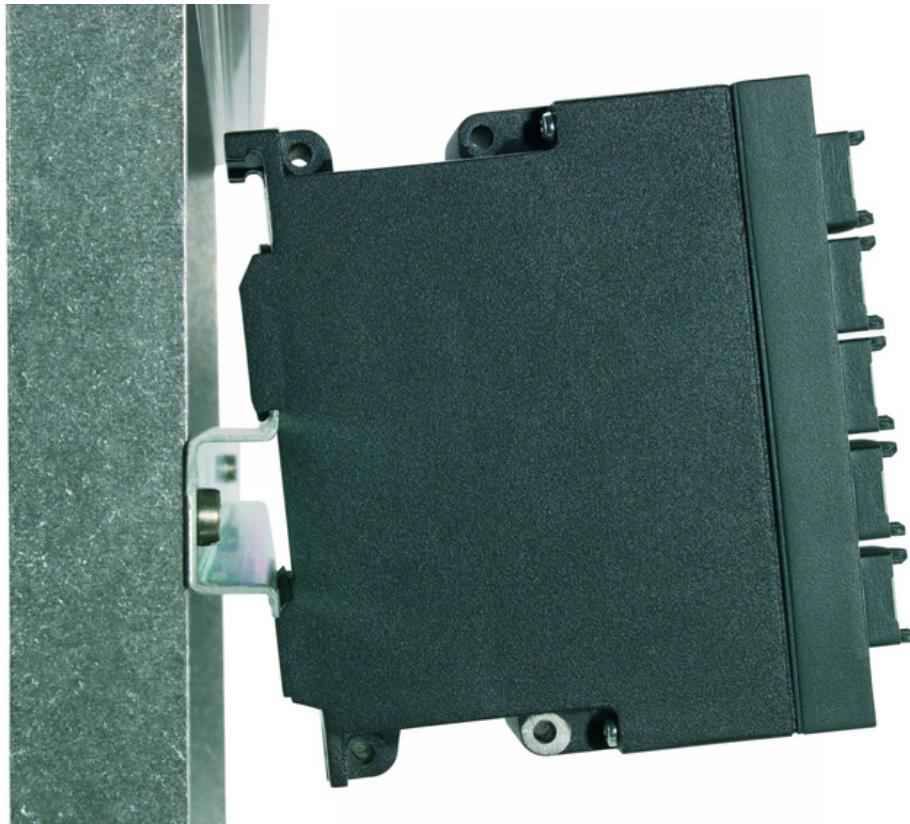
Figure 4-2   Removal from a 35 mm DIN rail

4.3 Installation on a standard rail

Installation on a SIMATIC S7-300 standard rail

To install the device on an S7-300 standard rail, follow the steps below:

1. Place the first housing guide of the device on the top edge of the S7-300 standard rail.

2. Screw the device to the underside of the standard rail (tightening torque 2 Nm).

3. Fit the connectors for the power supply. See also section "Power supply (Page 33)".

4. Fit the connectors for the signaling contacts. See also section "Signaling contacts (Page 35)".

5. Insert the terminal blocks into the sockets on the device.

Figure 4-3   Installation on a SIMATIC S7-300 standard rail

Uninstalling

To remove the device from the S7-300 standard rail, follow the steps below:

1. Disconnect all connected cables.

2. Release the screw holding the device on the bottom of the standard rail.

3. Lift the device off the standard rail.

4.4 Wall mounting

To mount the device on a wall, you require the following:

● 4 wall plugs, 6 mm in diameter and 30 mm long

● 4 screws 3.5 mm in diameter and 40 mm long

To mount the device on a wall, follow the steps below:

1. Prepare the drill holes for wall mounting. For the precise dimensions, refer to the section "Dimension drawings (Page 67)".

2. Fit the connectors for the power supply. See also section "Power supply (Page 33)".

3. Fit the connectors for the signaling contacts. See also section "Signaling contacts (Page 35)".

4. Insert the terminal blocks into the sockets on the device.

5. Screw the device to the wall.

Note

The wall mounting must be capable of supporting at least four times the weight of the device.

Connecting up

5

5.1   Power supply

The power supply is connected using a 4-pin plug-in terminal block. The power supply can be connected redundantly. Both inputs are isolated. There is no distribution of load. When a redundant power supply is used, the power supply unit with the higher output voltage supplies the device alone. The power supply is connected over a high resistance with the enclosure to allow an ungrounded set up. The two power supplies are non-floating.

The following figure shows the position of the power supply of the SCALANCE X-100 IE switches and the assignment of the terminal block.
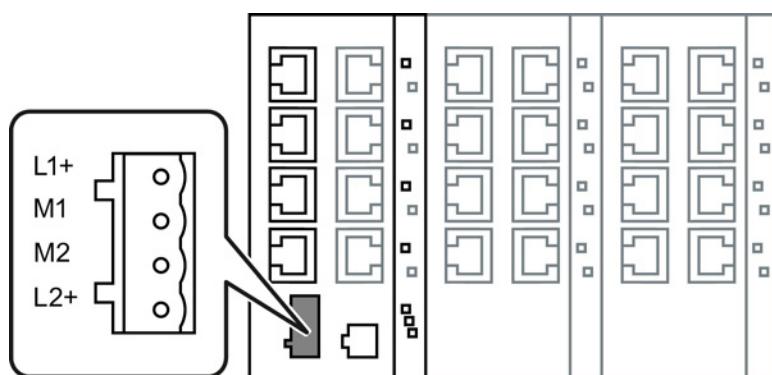
Pin number	Assignment
Pin 1	L1+ (24 VDC)
Pin 2	M1 (ground)
Pin 3	M2 (ground)
Pin 4	L2+ (24 VDC)

⚠ **WARNING**

Incorrect power supply

The power supply unit to supply the device must comply with NEC Class 2 (voltage range 18 - 32 V, current requirement 350 mA).

Do not operate the device with an AC voltage.

Never operate the device with DC voltages higher than 32 VDC.

⚠ **WARNING**

The equipment is designed for operation with Safety Extra-Low Voltage (SELV) by a Limited Power Source (LPS).

This means that only SELV / LPS complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 must be connected to the power supply terminals. The power supply unit for the equipment power supply must comply with NEC Class 2, as described by the National Electrical Code (r) (ANSI / NFPA 70).

If the equipment is connected to a redundant power supply (two separate power supplies), both must meet these requirements.

5.2 Signaling contact

The signaling contact is connected to a 2-pin plug-in terminal block. The signaling contact (relay contact) is a floating switch with which error/fault states can be signaled by breaking the contact.

NOTICE
Damage due to voltage being too high
The signaling contact can be subjected to a maximum load of 100 mA (safety extra-low voltage SELV, 24 VDC).
Higher voltages or currents can damage the device!

The following figure shows the position of the signaling contacts of the SCALANCE X-100 IE switches and the assignment of the terminal block.
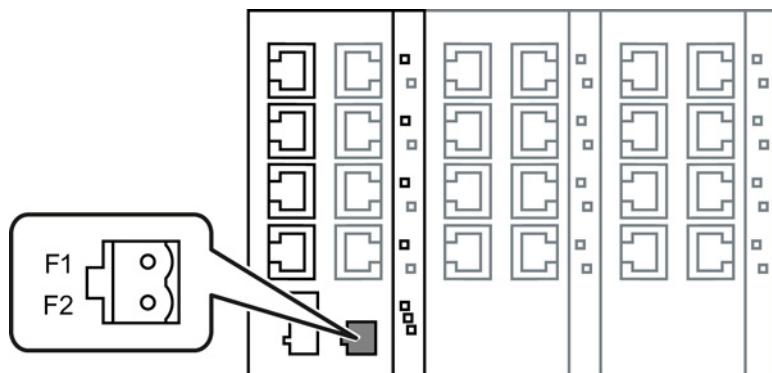
Pin number	Assignment
Pin 1	F1
Pin 2	F2

The following errors/faults can be signaled by the signaling contact:

● The failure of a link at a monitored port.

● The failure of one of the two monitored power supplies.

The connection or disconnection of a communication node on an unmonitored port does not lead to an error message.

The signaling contact remains activated until the error/fault is eliminated or until the current status is applied as the new desired status using the button.

When the device is turned off, the signaling contact is always activated (open).

5.3 Grounding

Installation on a DIN rail

The device is grounded over the DIN rail.

S7 standard rail

The device is grounded over its rear panel and the neck of the screw.

Wall mounting

The device is grounded by the securing screw in the unpainted hole.

Note that the device must be grounded over a securing screw with as low a low resistance as possible.

If the device is mounted on a non-conductive base, a grounding cable must be fitted. The grounding cable is not supplied with the device. Connect the paint-free surface of the device to the nearest grounding point using the grounding cable.

5.4 IE FC RJ-45 Plug 180

The rugged node connectors are designed for industry with PROFINET-compliant connectors and provide additional strain and bending relief with a locking mechanism on the casing.

Fitting the IE FC RJ45 Plug 180 to the IE FC Standard Cable

You will find the notes on installation in the instructions that ship with the IE FC RJ45 Plug 180.
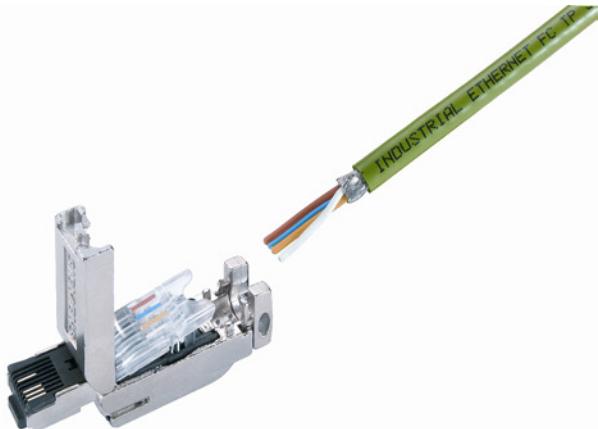

Figure 5-1   IE FC 45 Plug 180

Plugging in the IE FC RJ45 Plug 180

Plug the IE FC RJ45 Plug 180 into the twisted-pair port of the device until it locks in place.

Figure 5-2   Plugging in the IE FC RJ45 Plug 180

With its tight fit and locking mechanism with the PROFINET-compliant male connector IE FC RJ45 Plug 180, the securing collar on the TP port of the device ensures a rugged node attachment that provides strain and bending relief for the RJ-45 jack.

Pulling the IE FC RJ45 Plug 180

Press on the locking lever of the IE FC RJ45 Plug 180 gently to remove the plug.

If there is not enough space to release the lock with your hand, you can also use a 2.5 mm screwdriver. You can then remove the IE FC RJ45 Plug 180 from the RJ-45 jack.

Maintenance and troubleshooting

<div style="text-align: right; font-size: 3em;">6</div>

6.1 Possible sources of problems and how to deal with them

Fuses

Some of the Industrial Ethernet switches of the SCALANCE X-100 product line have a resettable fuse / PTC. If the fuse triggers (all LEDs are off despite correctly applied power supply), the device should be disconnected from the power supply for approximately 30 minutes before turning it on again.

Link display on the optical ports

The Industrial Ethernet switches SCALANCE X104-2, SCALANCE X106-1 and SCALANCE X112-2 support "far-end fault" on the optical ports but do not use this for the corresponding link display. This means that if there is only a cable connected in the receive direction on the optical port, a far-end fault is detected and no data is forwarded. The Link LED is already lit.

LED display when voltage drops

If both of the power supplies drop below approximately 14 V, this reduced voltage is indicated by the red fault LED. The L LEDs go off.

Device defective

If a fault develops, please send the device to your SIEMENS service center for repair. Repairs on-site are not possible.

Technical specifications

7

7.1 SCALANCE X104-2

Table 7- 1   Technical specifications of the SCALANCE X104-2

Technical specifications	
Order number	
SCALANCE X104-2	6GK5104-2BB00-2AA3
Connection to Industrial Ethernet	
Number	4
Design	RJ-45 jacks with MDI-X pinning
Properties	Half / full duplex
Transmission speed	10/100 Mbps
Optical connectors	
Number	2
Design	BFOC sockets
Properties	Full duplex to 100 Base-FX
Transmission speed	100 Mbps
Permitted cable lengths (Industrial Ethernet)	**Alternative combinations per length range**
0 to 55 m	• Max. 55 m IE TP Torsion Cable with IE FC RJ45 Plug 180 • Max. 45 m IE TP Torsion Cable with IE FC RJ45 + 10 m TP Cord via IE FC RJ45 Outlet
0 ... 85 m	• Max. 85 m IE FC TP Marine/Trailing Cable with IE FC RJ45 Plug 180 • Max. 75 m IE FC TP Marine/Trailing Cable + 10 m TP Cord via IE FC RJ45 Outlet
0 ... 100 m	• Max. 100 m IE FC TP Standard Cable with IE FC RJ45 Plug 180 • Max. 90 m IE FC TP Standard Cable + 10 m TP Cord via IE FC RJ45 Outlet

Technical specifications		
Optical parameters		
Cable type	Multimode glass FO cable, cable cross sections 62.5/125 µm and 50/125 µm	
Permitted cable length (glass FO cable)	Cable cross-section	Permitted cable length
	• 62.5/125 µm	• 0 to 4000 m
	• 50/125 µm	• 0 to 5000 m
Attenuation	≤ 1 dB/km at 1300 nm 1200 MHz x km at 1300 nm 6 dB max. permitted FO cable attenuation with 3 dB link power margin	
Electrical data		
Power supply	Voltage range	18 to 32 VDC Safe Extra Low Voltage (SELV)
	Rated voltage	24 VDC
	Design	4-terminal plug-in block
Signaling contact	Current	max. 100 mA
	Rated voltage	24 VDC
	Design	2-pin plug-in terminal block
Current consumption	Typical	160 mA
Power loss at 24 VDC	Typical	3.8 W
Overvoltage protection at input		PTC resettable fuse (0.6 A / 60 V)
Permitted ambient conditions		
Ambient temperature	During operation	-10 °C to +60 °C
	During storage	-40 °C to +80 °C
	During transportation	-40 °C to +80 °C
Relative humidity	During operation	≤ 95 % no condensation
Operating altitude	During operation	≤ 2,000 m above sea level at max. 56 °C ambient temperature
		≤ 3,000 m above sea level at max. 50 °C ambient temperature
Design, dimensions and weight		
Immunity to interference	EN 61000-6-2	
Emission	EN 61000-6-4	
Degree of protection	IP 30	
MTBF (EN/IEC 61709, 40 °C)	134.87 years	
Housing material	Basic housing	Die cast aluminum, powder coated
	Front cover	Polyphenylene ether + polystyrene (PPE+PS plastic)
Weight	780 g	
Dimensions (W x H x D)	60 x 125 x 124 mm	

Technical specifications	
Installation options	• Installation on a DIN rail • Installation on an S7-300 standard rail • Wall mounting

Switching properties	
Aging time	30 seconds
Max. number of learnable MAC addresses	2048
Response to LLDP frames	Blocking
Response to spanning tree BPDU frames	Forwarding
QoS priority queues	4

Note

The number of SCALANCE X Industrial Ethernet switches connected in a line influences the frame delay time.

When a frame passes through devices of the SCALANCE X-100 product line, it is delayed by the store and forward function of the switch

- with a 64 byte frame length by approx. 10 microseconds (at 100 Mbps)
- with a 1500 byte frame length by approx. 130 microseconds (at 100 Mbps)

This means that the more devices of the SCALANCE X-100 product line, the frame passes through, the longer the frame delay.

Note

Temperature code for c-UL-us for hazardous locations, FM and ATEX Zone 2

You will find the temperature code "T.." or the maximum ambient temperature "Ta: .." on the type plate.

7.2   SCALANCE X106-1

Table 7- 2   Technical specifications of the SCALANCE X106-1

Technical specifications	
Order number	
SCALANCE X106-1	6GK5106-1BB00-2AA3
Connection to Industrial Ethernet	
Number	6
Design	RJ-45 jacks with MDI-X pinning
Properties	Half / full duplex
Transmission speed	10/100 Mbps
Optical connectors	
Number	1
Design	BFOC socket
Properties	Full duplex to 100 Base-FX
Transmission speed	100 Mbps
Permitted cable lengths (Industrial Ethernet)	**Alternative combinations per length range**
0 to 55 m	• Max. 55 m IE TP Torsion Cable with IE FC RJ45 Plug 180 • Max. 45 m IE TP Torsion Cable with IE FC RJ45 + 10 m TP Cord via IE FC RJ45 Outlet
0 ... 85 m	• Max. 85 m IE FC TP Marine/Trailing Cable with IE FC RJ45 Plug 180 • Max. 75 m IE FC TP Marine/Trailing Cable + 10 m TP Cord via IE FC RJ45 Outlet
0 ... 100 m	• Max. 100 m IE FC TP Standard Cable with IE FC RJ45 Plug 180 • Max. 90 m IE FC TP Standard Cable + 10 m TP Cord via IE FC RJ45 Outlet

Technical specifications

Optical parameters

Cable type	Multimode glass FO cable, cable cross sections 62.5/125 µm and 50/125 µm	
Permitted cable length (glass FO cable)	Cable cross-section	Permitted cable length
	• 62.5/125 µm	• 0 to 4000 m
	• 50/125 µm	• 0 to 5000 m
Attenuation	≤ 1 dB/km at 1300 nm 1200 MHz x km at 1300 nm 6 dB max. permitted FO cable attenuation with 3 dB link power margin	

Electrical data

Power supply	Voltage range	18 to 32 VDC Safe Extra Low Voltage (SELV)
	Rated voltage	24 VDC
	Design	4-terminal plug-in block
Signaling contact	Current	max. 100 mA
	Rated voltage	24 VDC
	Design	2-pin plug-in terminal block
Current consumption	Typical	150 mA
Power loss at 24 VDC	Typical	3.6 W
Overvoltage protection at input		PTC resettable fuse (0.6 A / 60 V)

Permitted ambient conditions

Ambient temperature	During operation	-10 °C to +60 °C
	During storage	-40 °C to +80 °C
	During transportation	-40 °C to +80 °C
Relative humidity	During operation	≤ 95 % no condensation
Operating altitude	During operation	≤ 2,000 m above sea level at max. 56 °C ambient temperature
		≤ 3,000 m above sea level at max. 50 °C ambient temperature

Design, dimensions and weight

Immunity to interference	EN 61000-6-2	
Emission	EN 61000-6-4	
Degree of protection	IP 30	
MTBF (EN/IEC 61709, 40 °C)	136.65 years	
Housing material	Basic housing	Die cast aluminum, powder coated
	Front cover	Polyphenylene ether + polystyrene (PPE+PS plastic)
Weight	780 g	
Dimensions (W x H x D)	60 x 125 x 124 mm	

Technical specifications	
Installation options	• Installation on a DIN rail • Installation on an S7-300 standard rail • Wall mounting
Switching properties	
Aging time	30 seconds
Max. number of learnable MAC addresses	2048
Response to LLDP frames	Blocking
Response to spanning tree BPDU frames	Forwarding
QoS priority queues	4

Note

The number of SCALANCE X Industrial Ethernet switches connected in a line influences the frame delay time.

When a frame passes through devices of the SCALANCE X-100 product line, it is delayed by the store and forward function of the switch

• with a 64 byte frame length by approx. 10 microseconds (at 100 Mbps)

• with a 1500 byte frame length by approx. 130 microseconds (at 100 Mbps)

This means that the more devices of the SCALANCE X-100 product line, the frame passes through, the longer the frame delay.

Note

Temperature code for c-UL-us for hazardous locations, FM and ATEX Zone 2

You will find the temperature code "T.." or the maximum ambient temperature "Ta: .." on the type plate.

7.3 SCALANCE X108

Table 7- 3   Technical specifications of the SCALANCE X108

Technical specifications		
Order number		
SCALANCE X108	6GK5108-0BA00-2AA3	
Connection to Industrial Ethernet		
Number	8	
Design	RJ-45 jacks with MDI-X pinning	
Properties	Half / full duplex	
Transmission speed	10/100 Mbps	
Permitted cable lengths (Industrial Ethernet)	**Alternative combinations per length range**	
0 to 55 m	• Max. 55 m IE TP Torsion Cable with IE FC RJ45 Plug 180 • Max. 45 m IE TP Torsion Cable with IE FC RJ45 + 10 m TP Cord via IE FC RJ45 Outlet	
0 ... 85 m	• Max. 85 m IE FC TP Marine/Trailing Cable with IE FC RJ45 Plug 180 • Max. 75 m IE FC TP Marine/Trailing Cable + 10 m TP Cord via IE FC RJ45 Outlet	
0 ... 100 m	• Max. 100 m IE FC TP Standard Cable with IE FC RJ45 Plug 180 • Max. 90 m IE FC TP Standard Cable + 10 m TP Cord via IE FC RJ45 Outlet	
Electrical data		
Power supply	Voltage range	18 to 32 VDC Safe Extra Low Voltage (SELV)
	Rated voltage	24 VDC
	Design	4-terminal plug-in block
Signaling contact	Current	max. 100 mA
	Rated voltage	24 VDC
	Design	2-pin plug-in terminal block
Current consumption	Typical	140 mA
Power loss at 24 VDC	Typical	3.36 W
Overvoltage protection at input		PTC resettable fuse (0.6 A / 60 V)

Technical specifications		
Permitted ambient conditions		
Ambient temperature	During operation	-20 °C to +70 °C
	During storage	-40 °C to +80 °C
	During transportation	-40 °C to +80 °C
Relative humidity	During operation	≤ 95 % no condensation
Operating altitude	During operation	≤ 2,000 m above sea level at max. 56 °C ambient temperature
		≤ 3,000 m above sea level at max. 50 °C ambient temperature
Design, dimensions and weight		
Immunity to interference	EN 61000-6-2	
Emission	EN 61000-6-4	
Degree of protection	IP 30	
MTBF (EN/IEC 61709, 40 °C)	139.83 years	
Housing material	Basic housing	Die cast aluminum, powder coated
	Front cover	Polyphenylene ether + polystyrene (PPE+PS plastic)
Weight	780 g	
Dimensions (W x H x D)	60 x 125 x 124 mm	
Installation options	• Installation on a DIN rail • Installation on an S7-300 standard rail • Wall mounting	
Switching properties		
Aging time	30 seconds	
Max. number of learnable MAC addresses	2048	
Response to LLDP frames	Blocking	
Response to spanning tree BPDU frames	Forwarding	
QoS priority queues	4	

Note

The number of SCALANCE X Industrial Ethernet switches connected in a line influences the frame delay time.

When a frame passes through devices of the SCALANCE X-100 product line, it is delayed by the store and forward function of the switch

• with a 64 byte frame length by approx. 10 microseconds (at 100 Mbps)
• with a 1500 byte frame length by approx. 130 microseconds (at 100 Mbps)

This means that the more devices of the SCALANCE X-100 product line, the frame passes through, the longer the frame delay.

Note

Temperature code for c-UL-us for hazardous locations, FM and ATEX Zone 2

You will find the temperature code "T.." or the maximum ambient temperature "Ta: .." on the type plate.

7.4 SCALANCE X108PoE

Table 7- 4 Technical specifications of the SCALANCE X108PoE

Technical specifications		
Order number		
SCALANCE X108PoE	6GK5108-0PA00-2AA3	
Connection to Industrial Ethernet		
Number	8	
Design	RJ-45 jacks with MDI-X pinning	
Properties	Half / full duplex	
Transmission speed	10/100 Mbps	
Permitted cable lengths (Industrial Ethernet)	**Alternative combinations per length range**	
0 to 55 m	• Max. 55 m IE TP Torsion Cable with IE FC RJ45 Plug 180 • Max. 45 m IE TP Torsion Cable with IE FC RJ45 + 10 m TP Cord via IE FC RJ45 Outlet	
0 ... 85 m	• Max. 85 m IE FC TP Marine/Trailing Cable with IE FC RJ45 Plug 180 • Max. 75 m IE FC TP Marine/Trailing Cable + 10 m TP Cord via IE FC RJ45 Outlet	
0 ... 100 m	• Max. 100 m IE FC TP Standard Cable with IE FC RJ45 Plug 180 • Max. 90 m IE FC TP Standard Cable + 10 m TP Cord via IE FC RJ45 Outlet	
Electrical data		
Power supply	Voltage range	18 to 32 VDC Safe Extra Low Voltage (SELV)
	Rated voltage	24 VDC
	Design	4-terminal plug-in block
Signaling contact	Current	max. 100 mA
	Rated voltage	24 VDC
	Design	2-pin plug-in terminal block
Current consumption	Typical	1700 mA
Power loss at 24 VDC	Typical	10.0 W
Overvoltage protection at input		Fuse slow (4 A / 125 V)

Technical specifications

Permitted ambient conditions

Ambient temperature	During operation	-20 °C to +60 °C
	During storage	-40 °C to +80 °C
	During transportation	-40 °C to +80 °C
Relative humidity	During operation	≤ 95 % no condensation
Operating altitude	During operation	≤ 2,000 m above sea level at max. 56 °C ambient temperature
		≤ 3,000 m above sea level at max. 50 °C ambient temperature

Design, dimensions and weight

Immunity to interference	EN 61000-6-2	
Emission	EN 61000-6-4	
Degree of protection	IP 30	
MTBF (EN/IEC 61709, 40 °C)	61.64 years	
Housing material	Basic housing	Die cast aluminum, powder coated
	Front cover	Polyphenylene ether + polystyrene (PPE+PS plastic)
Weight	550 g	
Dimensions (W x H x D)	40 x 125 x 124 mm	
Installation options	• Installation on a DIN rail • Installation on an S7-300 standard rail • Wall mounting	

Switching properties

Aging time	30 seconds	
Max. number of learnable MAC addresses	2048	
Response to LLDP frames	Blocking	
Response to spanning tree BPDU frames	Forwarding	
QoS priority queues	4	

PoE properties

PoE standard	802.3af	
Performance	maximum	15.4 W

Note

As of an ambient temperature of 55 °C, there must be a clearance of 40 mm to neighboring devices on both sides.

Note

The number of SCALANCE X Industrial Ethernet switches connected in a line influences the frame delay time.

When a frame passes through devices of the SCALANCE X-100 product line, it is delayed by the store and forward function of the switch

- with a 64 byte frame length by approx. 10 microseconds (at 100 Mbps)
- with a 1500 byte frame length by approx. 130 microseconds (at 100 Mbps)

This means that the more devices of the SCALANCE X-100 product line, the frame passes through, the longer the frame delay.

Note

Temperature code for c-UL-us for hazardous locations, FM and ATEX Zone 2

You will find the temperature code "T.." or the maximum ambient temperature "Ta: .." on the type plate.

7.5 SCALANCE X112-2

Table 7- 5   Technical specifications of the SCALANCE X112-1

Technical specifications	
Order number	
SCALANCE X112-2	6GK5112-2BB00-2AA3
Connection to Industrial Ethernet	
Number	12
Design	RJ-45 jacks with MDI-X pinning
Properties	Half / full duplex
Transmission speed	10/100 Mbps
Optical connectors	
Number	2
Design	BFOC sockets
Properties	Full duplex to 100 Base-FX
Transmission speed	100 Mbps
Permitted cable lengths (Industrial Ethernet)	**Alternative combinations per length range**
0 to 55 m	• Max. 55 m IE TP Torsion Cable with IE FC RJ45 Plug 180 • Max. 45 m IE TP Torsion Cable with IE FC RJ45 + 10 m TP Cord via IE FC RJ45 Outlet
0 ... 85 m	• Max. 85 m IE FC TP Marine/Trailing Cable with IE FC RJ45 Plug 180 • Max. 75 m IE FC TP Marine/Trailing Cable + 10 m TP Cord via IE FC RJ45 Outlet
0 ... 100 m	• Max. 100 m IE FC TP Standard Cable with IE FC RJ45 Plug 180 • Max. 90 m IE FC TP Standard Cable + 10 m TP Cord via IE FC RJ45 Outlet

Technical specifications		
Optical parameters		
Cable type	Multimode glass FO cable, cable cross sections 62.5/125 µm and 50/125 µm	
Permitted cable length (glass FO cable)	Cable cross-section	Permitted cable length
	• 62.5/125 µm	• 0 to 4000 m
	• 50/125 µm	• 0 to 5000 m
Attenuation	≤ 1 dB/km at 1300 nm 1200 MHz x km at 1300 nm 6 dB max. permitted FO cable attenuation with 3 dB link power margin	
Electrical data		
Power supply	Voltage range	18 to 32 VDC Safe Extra Low Voltage (SELV)
	Rated voltage	24 VDC
	Design	4-terminal plug-in block
Signaling contact	Current	max. 100 mA
	Rated voltage	24 VDC
	Design	2-pin plug-in terminal block
Current consumption	Typical	215 mA
Power loss at 24 VDC	Typical	5.16 W
Permitted ambient conditions		
Ambient temperature	During operation	-10 °C to +70 °C
	During storage	-40 °C to +80 °C
	During transportation	-40 °C to +80 °C
Relative humidity	During operation	≤ 95 % no condensation
Operating altitude	During operation	≤ 2,000 m above sea level at max. 56 °C ambient temperature
		≤ 3,000 m above sea level at max. 50 °C ambient temperature
Design, dimensions and weight		
Immunity to interference	EN 61000-6-2	
Emission	EN 61000-6-3	
Degree of protection	IP 30	
MTBF (EN/IEC 61709, 40 °C)	61.3 years	
Housing material	Basic housing	Die cast aluminum, powder coated
	Front cover	Polyphenylene ether + polystyrene (PPE+PS plastic)
Weight	1100 g	
Dimensions (W x H x D)	120 x 125 x 124 mm	
Installation options	• Installation on a DIN rail • Installation on an S7-300 standard rail • Wall mounting	

Technical specifications	
Switching properties	
Aging time	30 seconds
Max. number of learnable MAC addresses	2048
Response to LLDP frames	Blocking
Response to spanning tree BPDU frames	Forwarding
QoS priority queues	4

Note

The number of SCALANCE X Industrial Ethernet switches connected in a line influences the frame delay time.

When a frame passes through devices of the SCALANCE X-100 product line, it is delayed by the store and forward function of the switch

- with a 64 byte frame length by approx. 10 microseconds (at 100 Mbps)
- with a 1500 byte frame length by approx. 130 microseconds (at 100 Mbps)

This means that the more devices of the SCALANCE X-100 product line, the frame passes through, the longer the frame delay.

Note

Temperature code for c-UL-us for hazardous locations, FM and ATEX Zone 2

You will find the temperature code "T.." or the maximum ambient temperature "Ta: .." on the type plate.

7.6 SCALANCE X116

Table 7- 6   Technical specifications of the SCALANCE X116

Technical specifications		
Order number		
SCALANCE X116	6GK5116-0BA00-2AA3	
Connection to Industrial Ethernet		
Number	16	
Design	RJ-45 jacks with MDI-X pinning	
Properties	Half / full duplex	
Transmission speed	10/100 Mbps	
Permitted cable lengths (Industrial Ethernet)	**Alternative combinations per length range**	
0 to 55 m	• Max. 55 m IE TP Torsion Cable with IE FC RJ45 Plug 180 • Max. 45 m IE TP Torsion Cable with IE FC RJ45 + 10 m TP Cord via IE FC RJ45 Outlet	
0 ... 85 m	• Max. 85 m IE FC TP Marine/Trailing Cable with IE FC RJ45 Plug 180 • Max. 75 m IE FC TP Marine/Trailing Cable + 10 m TP Cord via IE FC RJ45 Outlet	
0 ... 100 m	• Max. 100 m IE FC TP Standard Cable with IE FC RJ45 Plug 180 • Max. 90 m IE FC TP Standard Cable + 10 m TP Cord via IE FC RJ45 Outlet	
Electrical data		
Power supply	Voltage range	18 to 32 VDC Safe Extra Low Voltage (SELV)
	Rated voltage	24 VDC
	Design	4-terminal plug-in block
Signaling contact	Current	max. 100 mA
	Rated voltage	24 VDC
	Design	2-pin plug-in terminal block
Current consumption	Typical	185 mA
Power loss at 24 VDC	Typical	4.40 W

Technical specifications		
Permitted ambient conditions		
Ambient temperature	During operation	-20 ℃ to +70 ℃
	During storage	-40 ℃ to +80 ℃
	During transportation	-40 ℃ to +80 ℃
Relative humidity	During operation	≤ 95 % no condensation
Operating altitude	During operation	≤ 2,000 m above sea level at max. 56 ℃ ambient temperature
		≤ 3,000 m above sea level at max. 50 ℃ ambient temperature
Design, dimensions and weight		
Immunity to interference	EN 61000-6-2	
Emission	EN 61000-6-3	
Degree of protection	IP 30	
MTBF (EN/IEC 61709, 40 ℃)	61.3 years	
Housing material	Basic housing	Die cast aluminum, powder coated
	Front cover	Polyphenylene ether + polystyrene (PPE+PS plastic)
Weight	1100 g	
Dimensions (W x H x D)	120 x 125 x 124 mm	
Installation options	• Installation on a DIN rail • Installation on an S7-300 standard rail • Wall mounting	
Switching properties		
Aging time	30 seconds	
Max. number of learnable MAC addresses	2048	
Response to LLDP frames	Blocking	
Response to spanning tree BPDU frames	Forwarding	
QoS priority queues	4	

Note

The number of SCALANCE X Industrial Ethernet switches connected in a line influences the frame delay time.

When a frame passes through devices of the SCALANCE X-100 product line, it is delayed by the store and forward function of the switch

- with a 64 byte frame length by approx. 10 microseconds (at 100 Mbps)
- with a 1500 byte frame length by approx. 130 microseconds (at 100 Mbps)

This means that the more devices of the SCALANCE X-100 product line, the frame passes through, the longer the frame delay.

Note

Temperature code for c-UL-us for hazardous locations, FM and ATEX Zone 2

You will find the temperature code "T.." or the maximum ambient temperature "Ta: .." on the type plate.

7.7 SCALANCE X124

Table 7- 7   Technical specifications of the SCALANCE X124

Technical specifications		
Order number		
SCALANCE X124	6GK5124-0BA00-2AA3	
Connection to Industrial Ethernet		
Number	24	
Design	RJ-45 jacks with MDI-X pinning	
Properties	Half / full duplex	
Transmission speed	10/100 Mbps	
Permitted cable lengths (Industrial Ethernet)	**Alternative combinations per length range**	
0 to 55 m	• Max. 55 m IE TP Torsion Cable with IE FC RJ45 Plug 180 • Max. 45 m IE TP Torsion Cable with IE FC RJ45 + 10 m TP Cord via IE FC RJ45 Outlet	
0 ... 85 m	• Max. 85 m IE FC TP Marine/Trailing Cable with IE FC RJ45 Plug 180 • Max. 75 m IE FC TP Marine/Trailing Cable + 10 m TP Cord via IE FC RJ45 Outlet	
0 ... 100 m	• Max. 100 m IE FC TP Standard Cable with IE FC RJ45 Plug 180 • Max. 90 m IE FC TP Standard Cable + 10 m TP Cord via IE FC RJ45 Outlet	
Electrical data		
Power supply	Voltage range	18 to 32 VDC Safe Extra Low Voltage (SELV)
	Rated voltage	24 VDC
	Design	4-terminal plug-in block
Signaling contact	Current	max. 100 mA
	Rated voltage	24 VDC
	Design	2-pin plug-in terminal block
Current consumption	Typical	200 mA
Power loss at 24 VDC	Typical	4.80 W

Technical specifications		
Permitted ambient conditions		
Ambient temperature	During operation	-20 ℃ to +70 ℃
	During storage	-40 ℃ to +80 ℃
	During transportation	-40 ℃ to +80 ℃
Relative humidity	During operation	≤ 95 % no condensation
Operating altitude	During operation	≤ 2,000 m above sea level at max. 56 ℃ ambient temperature
		≤ 3,000 m above sea level at max. 50 ℃ ambient temperature
Design, dimensions and weight		
Immunity to interference	EN 61000-6-2	
Emission	EN 61000-6-3	
Degree of protection	IP 30	
MTBF (EN/IEC 61709, 40 °C)	49.3 years	
Housing material	Basic housing	Die cast aluminum, powder coated
	Front cover	Polyphenylene ether + polystyrene (PPE+PS plastic)
Weight	1500 g	
Dimensions (W x H x D)	180 x 125 x 124 mm	
Installation options	• Installation on a DIN rail • Installation on an S7-300 standard rail • Wall mounting	
Switching properties		
Aging time	30 seconds	
Max. number of learnable MAC addresses	2048	
Response to LLDP frames	Blocking	
Response to spanning tree BPDU frames	Forwarding	
QoS priority queues	4	

Note

The number of SCALANCE X Industrial Ethernet switches connected in a line influences the frame delay time.

When a frame passes through devices of the SCALANCE X-100 product line, it is delayed by the store and forward function of the switch

• with a 64 byte frame length by approx. 10 microseconds (at 100 Mbps)

• with a 1500 byte frame length by approx. 130 microseconds (at 100 Mbps)

This means that the more devices of the SCALANCE X-100 product line, the frame passes through, the longer the frame delay.

Note

Temperature code for c-UL-us for hazardous locations, FM and ATEX Zone 2

You will find the temperature code "T.." or the maximum ambient temperature "Ta: .." on the type plate.

Certifications and approvals

<div style="text-align: right; font-size: 2em;">8</div>

The SIMATIC NET products described in these Operating Instructions have the approvals listed below.

Note

Issued approvals on the type plate of the device

The specified approvals apply only when the corresponding mark is printed on the product. You can check which of the following approvals have been granted for your product by the markings on the type plate.

EMC directive

The devices meet the requirements of the EC Directive 2004/108/EC "Electromagnetic Compatibility".

Area of application

The devices are designed for installation in an industrial environment:

Area of application	Requirements for	
	Emission	Immunity
Industrial area	EN 61000-6-4 : 2007 + A1 : 2011	EN 61000-6-2 : 2005 + AC : 2005

Installation Guidelines

The devices meet the requirements if you keep to the installation instructions and safety-related notices as described here and in the manual "SIMATIC NET Industrial Ethernet Twisted Pair and Fiber Optic Networks (http://support.automation.siemens.com/WW/view/en/8763736)" when installing and operating the device.

Declaration of Conformity

The EC Declaration of Conformity is available for the responsible authorities according to the above-mentioned EC Directive at the following address:

Siemens Aktiengesellschaft
Postfach 4848
D-90026 Nürnberg, Germany

Notes for the Manufacturers of Machines

The devices are not machines in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EC for these devices.

If the devices are part of the equipment of a machine, they must be included in the declaration of conformity procedure by the manufacturer of the machine.

E1

The SCALANCE X108 and SCALANCE X108PoE IE switches meet the requirements of the directive ECE-G 95/54/EC.

Test number 024734

ATEX (explosion protection directive)

⚠ WARNING
When using SIMATIC NET products in hazardous area zone 2, make absolutely sure that the associated conditions in the following document are adhered to:
"SIMATIC NET Product Information Use of subasseblies/modules in a Zone 2 Hazardous Area".
You will find this document
• on the data medium that ships with some devices.
• on the Internet pages of Siemens Industry Online Support (http://support.automation.siemens.com/WW/view/en).
Enter the document identification number C234 as the search term.

SIMATIC NET products meet the requirements of the EC directive:94/9/EC "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

ATEX classification:

II 3 G Ex nA IIC T4 Gc

KEMA 07ATEX0145 X

The products meet the requirements of the following standards:

- EN 60079-15: 2010 (electrical apparatus for potentially explosive atmospheres; Type of protection "n")
- EN 60079-0: 2009 (Explosive atmospheres - Part 0: Equipment - General requirements)

IECEx

The SIMATIC NET products meet the requirements of explosion protection according to IECEx.

IECEx classification:

Ex nA IIC T4 Gc

DEK 14.0025X

The products meet the requirements of the following standards:

- IEC 60079-15 : 2010 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
- IEC 60079-0 : 2011 (Explosive atmospheres - Part 0: Equipment - General requirements)

FM

The product meets the requirements of the standards:

- Factory Mutual Approval Standard Class Number 3611
- FM Hazardous (Classified) Location Electrical Equipment:
  Non Incendive / Class I / Division 2 / Groups A,B,C,D / T4 and
  Non Incendive / Class I / Zone 2 / Group IIC / T4

C-Tick

The product meets the requirements of the AS/NZS 2064 standard (Class A).

cULus Approval for Information Technology Equipment

cULus Listed I. T. E.

Underwriters Laboratories Inc. complying with

- UL 60950-1 (Information Technology Equipment)
- CSA C22.2 No. 60950-1-03

Report no. E115352

cULus Approval Hazardous Location

cULus Listed I. T. E. FOR HAZ. LOC.

Underwriters Laboratories Inc. complying with

- UL 60950-1 (Information Technology Equipment)
- ANSI/ISA 12.12.01-2007
- CSA C22.2 No. 213-M1987

Approved for use in
Cl. 1, Div. 2, GP A, B, C, D T4
Cl. 1, Zone 2, GP IIC T4

Report no. E240480

Mechanical stability (in operation)

Device	DIN EN 60068-2-6 oscillation	DIN EN 60068-2-6 oscillation	DIN EN 60068-2-6 oscillation	DIN EN 60068-2-29 permanent shock	DIN EN 60068-2-29 permanent shock
	10 - 58 Hz: 0.075 mm 58 - 500 Hz: 10 m/s² 10 cycles	10 - 58 Hz: 0.15 mm 58 - 500 Hz: 20 m/s² 10 cycles	5 - 8.51 Hz: 3.5 mm 8.51 - 500 Hz: 10 m/s² 10 cycles	100 m/s², 16 ms duration 100 shocks per axis	250 m/s², 6 ms duration 1000 shocks per axis
X104-2	●	●	●	●	●
X106-1	●	●	●	●	●
X108	●	●	●	●	●

Device	DIN EN 60068-2-6 vibration	DIN EN 60068-2-6 vibration	DIN EN 60068-2-6 vibration	DIN EN 60068-2-6 vibration ship building	DIN EN 60068-2-27 shock	DIN EN 60068-2-29 permanent shock	DIN EN 60068-2-29 permanent shock
	2 - 13.2 Hz: 2.0 mmPP 13.2 - 100 Hz: 7 m/s² 1 sweep	5 - 8.51 Hz: 7.0 mmPP 8.51 - 500 Hz: 10 m/s² 1 oct/min, 20 sweeps	5 - 8.51 Hz: 7.0 mmPP 8.51 - 150 Hz: 10 m/s² 1 oct/min, 10 cycles	2 - 25 Hz: 3.2 mmPP 25 - 100 Hz: 40 m/s² 1 sweep	150 m/s², 11 ms duration 6 shocks per axis	250 m/s², 6 ms duration 1000 shocks per axis	100 m/s², 16 ms duration 100 shocks per axis
X108PoE	●	●	●	●	●	●	●

Device	DIN EN 60068-2-6 oscillation	DIN EN 60068-2-27 shock
	5 - 8.51 Hz: 3.5 mm 8.51 - 500 Hz: 10 m/s² 1 oct/min, 10 cycles	150 m/s², 16 ms duration 6 shocks per axis
X112-2	●	●
X116	●	●
X124	●	●

Dimension drawings

<div style="text-align:right; font-size:3em;">9</div>
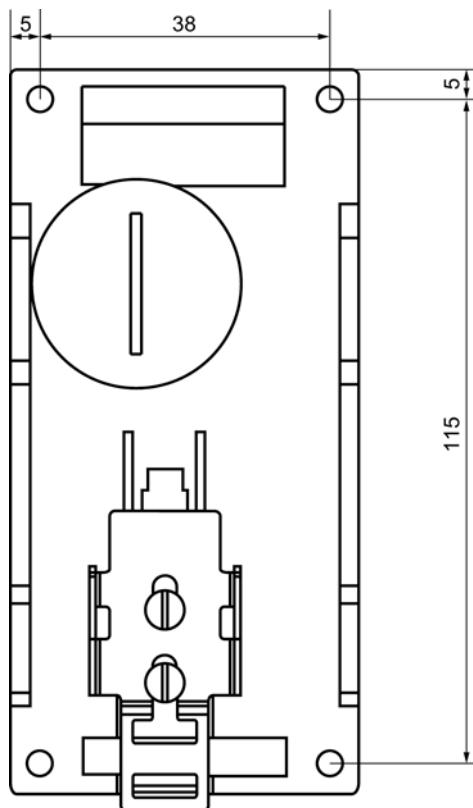
Figure 9-1   Dimension drawing, rear of the SCALANCE X104-2, X106-1, X108, X108PoE
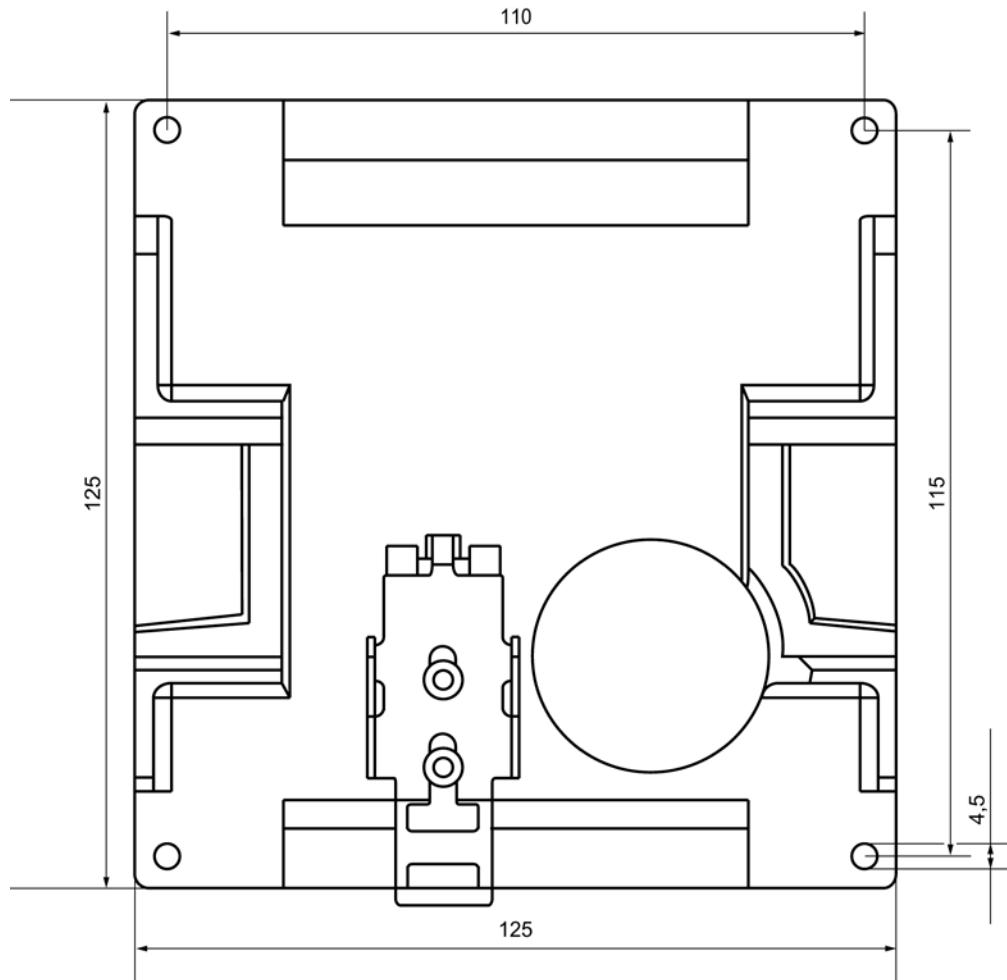
Figure 9-2   Dimension drawing, rear of the SCALANCE X116, X112-2
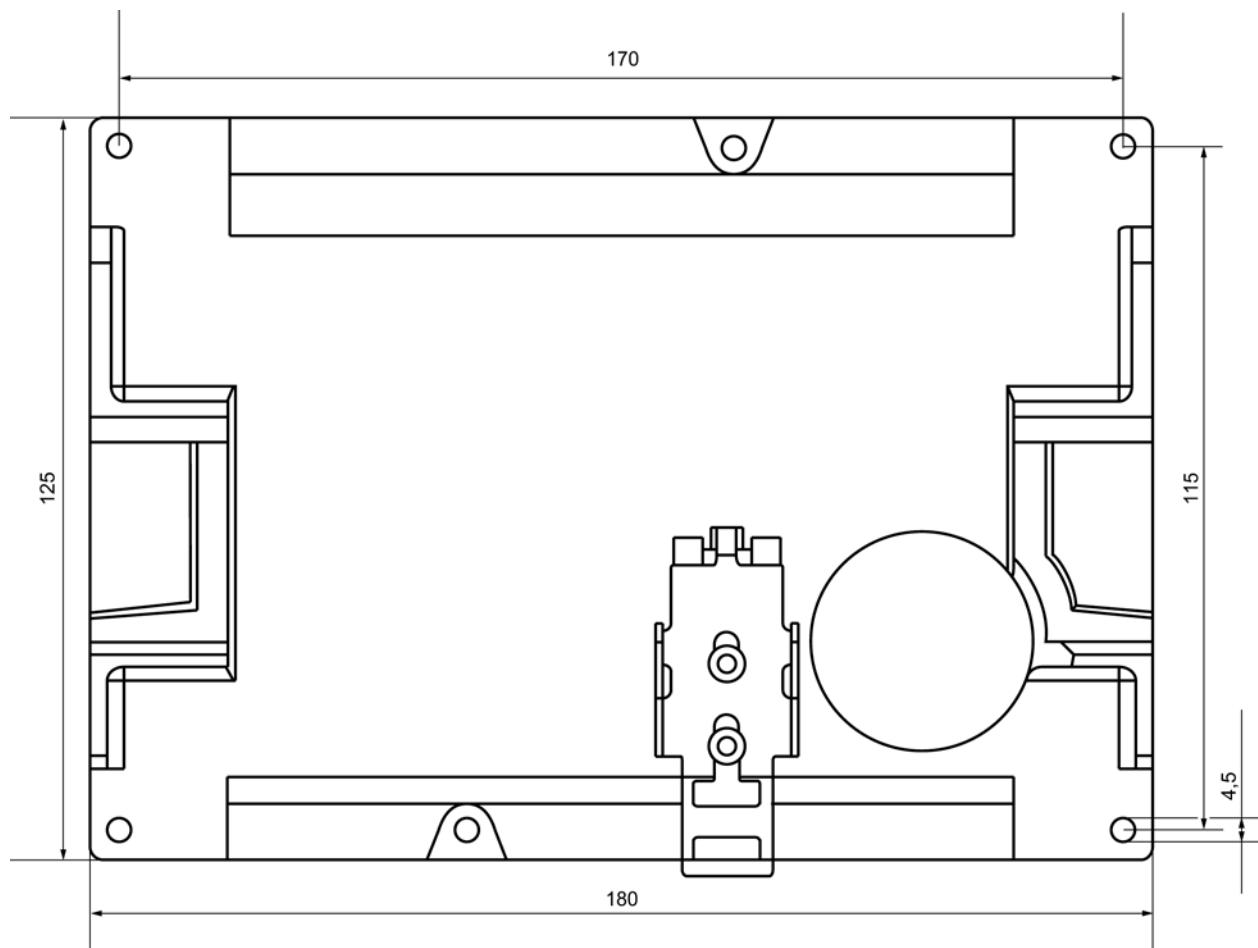
Figure 9-3   Dimension drawing, rear of the SCALANCE X124
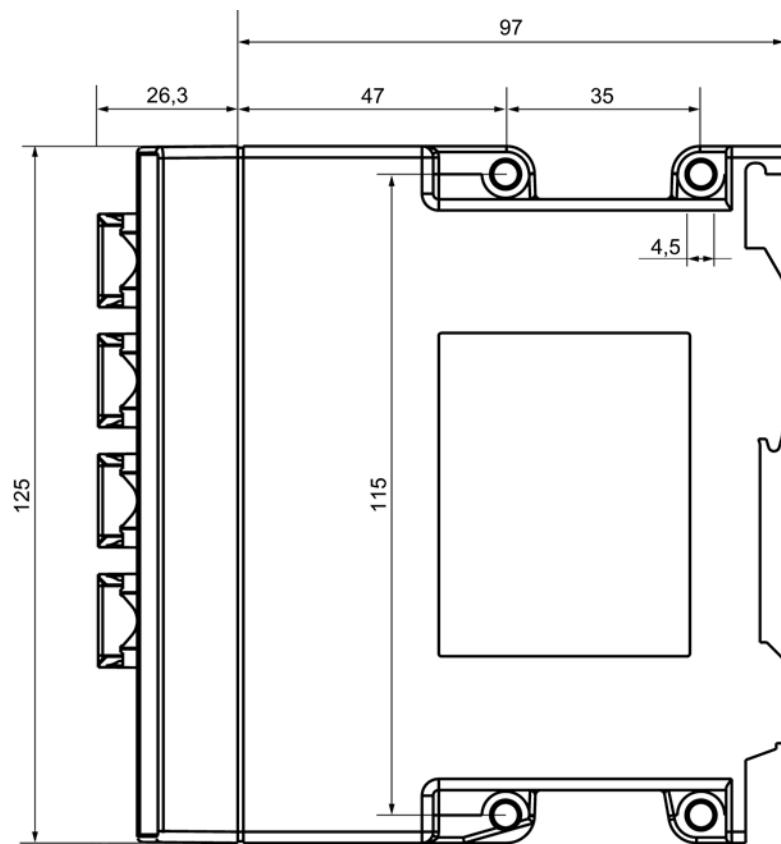
Figure 9-4   Dimension drawing, side view
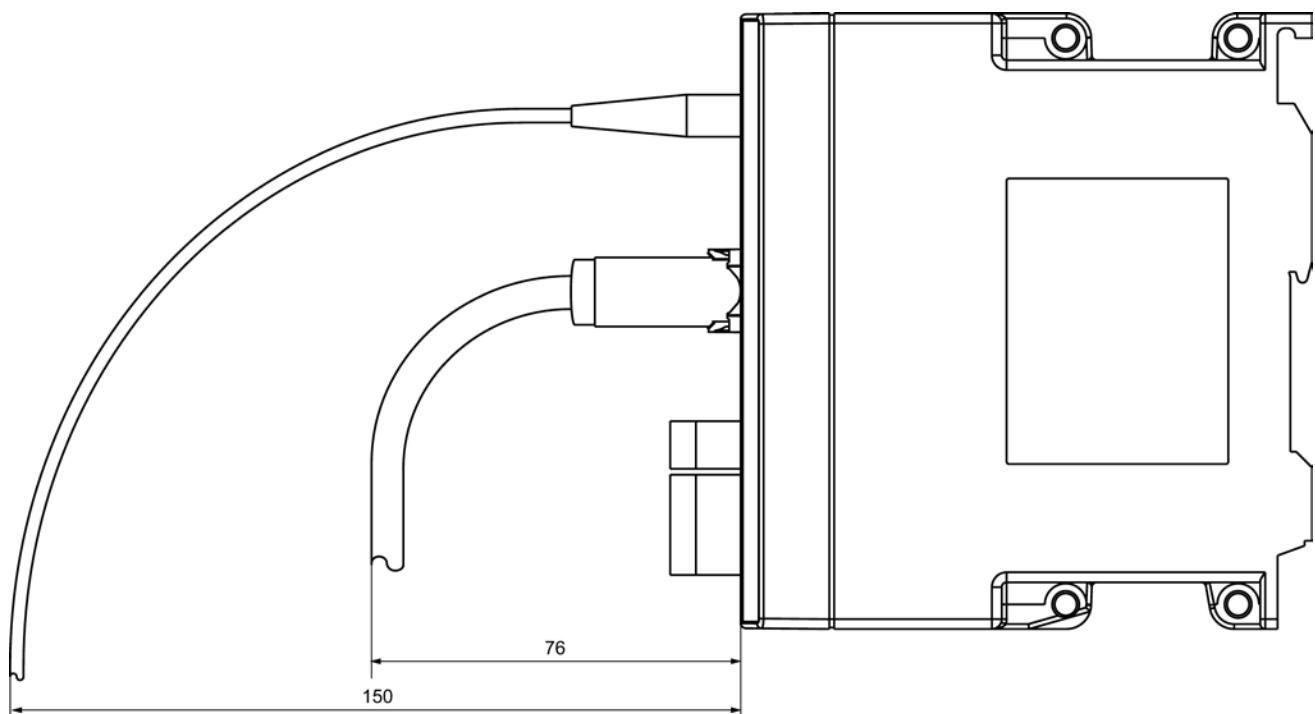
Figure 9-5   Dimension drawing, bending radii

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SCALANCE X-100

Operating Instructions, 07/2014, A2B00060666-05